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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,967	08/20/2003	Hiroyuki Nansei	030993	4992
38834	7590	12/02/2004	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP			THOMAS, TONIAE M	
1250 CONNECTICUT AVENUE, NW			ART UNIT	
SUITE 700			PAPER NUMBER	
WASHINGTON, DC 20036			2822	

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,967

Applicant(s)

NANSEI ET AL.

Examiner

Toniae M. Thomas

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 12-38 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 39 and 40 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,8 and 9 is/are rejected.
- 7) ☒ Claim(s) 2,5-7,10 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This action is an official response to the amendment filed on 17 September 2004.
2. The amendment added claims 39 and 40. Currently, claims 1-40 are pending. Claims 12-29 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Claims 30-38 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. *Claims 1, 3, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer (US 2003/0040171 A1) in view of Chua et al. (US 2004/0038486 A1).*^{1,2}

¹ The Weimer reference was relied upon in the previous Office action.

² Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

The Weimer US pre-grant published application (Weimer) discloses a method for manufacturing a semiconductor device (figs. 1-4 and accompanying text). The method comprises the following steps, **as recited in claim 1**: forming a lower silicon oxide film 16 (fig. 1 and par. 23, lines 6-7); forming a silicon film 18 on the lower silicon oxide film (fig. 2 and par. 24, lines 1-5); and forming a silicon nitride film 20 on the lower silicon oxide film 16 to completely nitride the silicon film by a plasma nitriding method (fig. 3; par. 26, lines 1-10; and par. 28, lines 1-12), wherein a multilayered insulating film including at least the lower silicon oxide film and the silicon nitride film is formed (fig. 3). The silicon film is formed under a temperature condition of 700°C or below, **as recited in claim 3** (par. 25, lines 1-8). The silicon nitride film is formed by conducting nitriding processing in which plasma is excited by microwave in an atmosphere of a source gas containing nitrogen to generate a nitrogen radical, **as recited in claim 8** (par. 28, lines 1-12). The source gas containing nitrogen is selected from one of nitrogen (N_2) and ammonia (NH_3) (par. 28, lines 9-12). When nitrogen is used as the source gas, the source gas does not contain hydrogen, **as recited in claim 9**.

While Weimer teaches using a plasma nitriding method to nitridize the silicon film, Weimer does not teach that the nitriding is done with a surface wave-plasma generated by a plasma nitriding method, **as recited in claim 1**.

The Chua et al. pre-grant published application (Chua) discloses a method for forming a nitride layer using a plasma nitriding method (par. 0061). The plasma nitriding method is selected from one of an ICP system, a radial line slot antenna system, an ECR system, etc. (par. 0061). The radial line slot antenna system is a plasma nitriding method that generates a surface wave-plasma.

Weimer teaches using an ICP system, an ECR system, or other plasma nitriding systems to nitridize the silicon film (par. 008, lines 21-25). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to nitridize the silicon film using a radial line slot antenna system, as taught by Chua, because plasma nitriding using a radial line slot antenna system is well known in the art.

4. *Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Weimer and Chua as applied to claim 1 above, and further in view of Wolf (Silicon Processing for the VLSI Era – Vol. 2).*

Weimer lacks anticipation in not teaching that the silicon nitride film is a charge-storage film of a memory cell, **as recited in claim 4.**

Wolf discloses a method for forming an MNOS EEPROM device (page 628, §8.7.1). The MNOS EEPROM cell consists of a single MOS like transistor (page 628, §8.7.1, lines 1-3). The transistor's gate insulation film comprises a multilayered oxide-nitride (ON) film, wherein the nitride layer is a charge storage film (page 628, §8.7.1, lines 1-3).

Since Weimer and Wolf are from the same field of endeavor, the purpose disclosed in Wolf would have been recognized in the pertinent art of Weimer by one of ordinary skill in the art at the time the invention was made.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the combination of Weimer and Chua, by forming the ON multilayered film in an MNOS EEPROM cell, such that the silicon nitride film functions as a charge storage film, as taught by Wolf, since it is common to use an ON multilayered film as a gate insulation film in an MNOS EEPROM cell.

Allowable Subject Matter

5. Claims 2, 5-7, 10, and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 39 and 40 are allowable.

Response to Arguments

6. Applicant's arguments with respect to claims 1-6 and 8-11 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 a.m. to 5:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMJ

24 November 2004



Mary Wilczewski
Primary Examiner